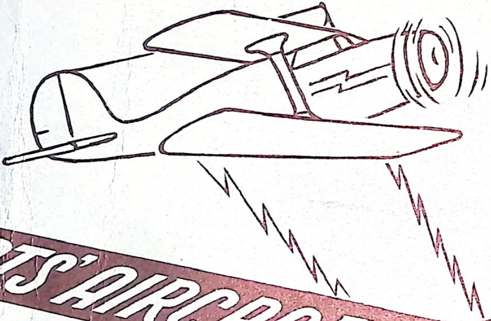
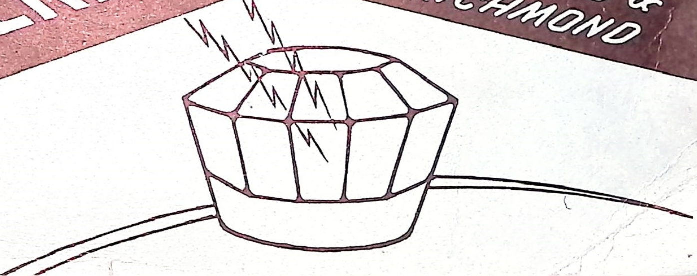


PILOTS' AIRCRAFT RADIO OPERATION MANUAL

HAVENS & RICHMOND



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PILOTS'
AIRCRAFT RADIO OPERATION MANUAL

-BY-

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-IN-
CIVIL AIR REGULATIONS - INSTRUMENTS
AERIAL NAVIGATION - RADIO
METEOROLOGY - PARACHUTES
AIRCRAFT - ENGINES

SOLE AGENT
LINDSEY AIRADIO
MUNICIPAL AIRPORT - WICHITA, KANSAS

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FOREWORD

It is common knowledge that most pilots prefer to fly aircraft equipped with two-way radio or at least a radio receiver. For the most part, only a few civilian pilots have been able to satisfy this desire. Radios and radio parts have not been available to civilians for several years. In those instances where there were some sort of radio installation in the aircraft, the pilot often did NOT know proper radio procedure and operation or had no license. Even today many pilots are unable to properly utilize a simple radio receiver.

Radio manufacturers are now going into tremendous production scales and aircraft radios will soon become numerous and inexpensive. Most airports will require all aircraft operating in their vicinities to be equipped with radio installations. It follows then, that all pilots, present and future, will find it necessary to know how to operate aircraft radios according to the established Civil Aeronautics Administration and Federal Communications Commission procedures.

With this thought in mind, the authors have included in this booklet all essential information on aircraft radio operation. Included is the examination for the 3rd. Class - Restricted Radiotelephone Operator's Permit and the necessary information needed for the pilot to be able to contact any control tower or radio range, and to secure information or assistance in order to remain clear of any possible danger arising through weather or traffic conditions.

The AIRCRAFT RADIO OPERATION MANUAL for PILOTS takes the pilot through all necessary procedures for taxying, taking-off, flying, landing, filing flight plans and other operations. All phases of two-way radio contacts are covered.

The purpose of this booklet will be achieved if the reader develops a feeling of confidence in his radio transmissions and acquires the ability of being able to utiluze his aircraft radio to its fullest possibilities.

You will find all left hand pages blank for your convenience in recording notes and additional information.

J. J. Havens
D. M. Richmond

PART I

THE RESTRICTED RADIOTELEPHONE OPERATOR'S PERMIT

When appearing for a Federal Communications Commission examination, an applicant should be prepared to write the examination with pen. The F.C.C. offices listed below conduct examinations in cities in their respective districts, and will send you their examination schedule on request. Contact your nearest F.C.C. office for specific information.

Dist. Address.

1. Customhouse, 7th. Floor
Boston, 9, Mass.

2. 748 Federal Building
641 Washington Street
New York 14, N. Y.

3. Room 1200, New U. S. Customhouse
2nd. & Chestnut Streets
Philadelphia 6, Pa.

4. 508 Old Town Bank Building
Gay Street & Falsway
Baltimore 2, Md.

5. Room 402
New Post Office Building
Norfolk 10, Va.

6. 411 Federal Annex
Atlanta 3, Ga.

Dist. Address.

6s. Radio Inspector
214-218 Post Office Bldg.
P. O. Box 77
Savannah, Ga.

7. 312 Federal Bldg.
P. O. Box 150
Miami 1, Florida

7s. Radio Inspector
409-410 Post Office Bldg.
Tampa 2, Florida

8. 400 Audubon Bldg.
New Orleans 16, La.

9. 404 Post Office Bldg.
Galveston, Texas

9s. Radio Inspector
329 Post Office Bldg.
P. O. Box 1527
Beaumont, Texas

Dist. Address.

10. 500 U.S. Terminal Annex Bldg.
P. O. Box 5238
Dallas 2, Texas

11. 539 U.S. Post Office Bldg. & Courthouse Bldg.
Temple & Spring Streets.
Los Angeles 12, Calif.

11s. Radio Inspector
307 U.S. Customhouse & Courthouse Bldg.
Union and "F" Streets
San Diego 1, Calif.

12. 328 Customhouse
San Francisco 26, Calif.

13. 805 Terminal Sales Bldg.
Portland 5, Oregon

14. 808 Federal Office Bldg.
Seattle 4, Washington

Dist. Address

15. 504 Customhouse
Denver 2, Colorado

16. 208 Uptown Post Office & Fed. Cts. Bldg.
5th & Washington Streets
St. Paul 2, Minn.

17. 809 U. S. Court House
Kansas City 6, Missouri

18. 246 U. S. Court House
Chicago 4, Illinois

19. 1029 New Federal Bldg.
Detroit 26, Michigan

Dist. Address

19s. Radio Inspector
541 Old Post Office Bldg.
Cleveland 14, Ohio

20. 328 Federal Building
Buffalo 3, N. Y.

21. 609 Stangenwald Bldg.
Honolulu 1, T. H.

22. 322-323 Federal Bldg.
P. O. Box 2987
San Juan 13, P. R.

23. 7-8 Shattuck Building
Juneau, Alaska

HOW TO GET A RESTRICTED RADIOTELEPHONE OPERATOR'S PERMIT

In order to operate two-way radio, an operator is required to hold at least a restricted radiotelephone operator's permit, issued by the F.C.C. The examination for this permit consists of 10 questions, as follows:

Three on the Communications Act of 1934.
Two on the International General Radio Regulations (Cairo Revision).
Five on the Rules and Regulations of the Federal Communication Commission.

The 10 questions that make up any given examination are selected from those in the following pages. The answers to these questions have been included here as an aid in presenting the information for passing the examination. Those desiring more complete information with regard to the basic law are referred to the "Study Guide and Reference Material for Commercial Radio Operator Examinations," published by the F. C. C. This may be obtained from the Superintendent of Documents, Washington, D. C. (Price 15 cents, no stamps accepted). Additional information may also be obtained from any local inspector of the F. C. C.

QUESTIONS AND ANSWERS FOR RESTRICTED RADIOTELEPHONE OPERATOR'S PERMIT

1. Q. STATE FIVE GROUNDS, ON ANY ONE OF WHICH THE FEDERAL COMMUNICATIONS COMMISSION HAS THE AUTHORITY TO SUSPEND A RADIO OPERATOR'S LICENSE OR PERMIT.

Ans. The Federal Communications Commission may suspend a radio operator's license or permit for:

a. Violation of any provision of any act, treaty, or convention binding on the United States which the Commission is authorized to administer, or any regulation made by the Commission under any such act, treaty, or convention.

b. Failure to carry out a lawful order of the master or person lawfully in charge of a ship or aircraft on which the operator is employed.

c. Willfully damaging or permitting radio apparatus or installations to be damaged.

d. Transmitting superflous radio communications or signals, or communications containing profane or obscene words, language, or meaning.

e. Transmission of false or deceptive signals or communications.

f. Using a call signal or letter which has not been assigned by proper authority to the station which he is operating.

g. Willfully or maliciously interfering with any other radio communication or signal.

h. Obtaining or attempting to obtain, or assisting another to obtain, or to attempt to obtain an operator's license by fraudulent means.

2. Q. IS AN OPERATOR SUBJECT TO THE PENAL PROVISIONS OF THE ACT IF HE VIOLATES THE TERMS OF THE TREATY OF WHICH THE UNITED STATES IS A PARTY?

Ans. Operators are subject to the penal provisions of the Act for violating the terms of the radio treaty of which the United States is a party.

3. Q. STATE AT LEAST TWO PROVISIONS MADE IN THE COMMUNICATIONS ACT TO INSURE THE PRIORITY OF COMMUNICATIONS OR SIGNALS RELATING TO SHIPS IN DISTRESS.

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Ans. The Communications Act provides that:

a. All radio stations, including government stations and stations on board foreign vessels, when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress, and

b. All radio stations shall cease sending on all frequencies which will interfere with radio communications or signals of distress, and except when engaged in answering or aiding a ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused in radio communications or signals relating thereto, and shall assist the vessel in distress so far as possible by complying with its instructions.

4. Q. IN WHAT CLASS OF RADIO STATION, AND UNDER WHAT CONDITIONS IS AN OPERATOR PERMITTED TO ADJUST THE TRANSMITTER FOR A MAXIMUM OF RADIATION WITHOUT REGARD TO THE INTERFERENCE PRODUCED?

Ans. Radio stations on board ships may be adjusted to produce a maximum of radiation irrespective of the amount of interference which may thus be caused for the purpose of transmitting distress signals.

5. Q. IN WHAT CASES MAY A TRANSMITTER ON BOARD SHIP BE ADJUSTED TO PRODUCE A MAXIMUM OF RADIATION IRRESPECTIVE OF INTERFERENCE WHICH MAY BE CAUSED?

Ans. While engaged in transmitting a distress message.

6. Q. WHAT COMMUNICATIONS, IF ANY, ARE NOT SUBJECT TO THE SECRECY PROVISIONS OF THE COMMUNICATIONS ACT?

Ans. Radio transmissions which broadcast entertainment, weather, or programs of general interest, transmission by amateurs or others for the use of the general public, or transmissions relating to ships in distress are exempted from the secrecy provisions of the Communications Act.

7. Q. STATE IN YOUR OWN WORDS THE LAW REGARDING THE TRANSMISSION OF FALSE CALLS AND COMMUNICATIONS RELATING TO DISTRESS.

Ans. It is unlawful to transmit false signals of distress or communications relating thereto. Signals of distress may be transmitted only upon orders of the master or other person lawfully in command of the ship on which the operator is employed.

8. Q. STATE IN YOUR OWN WORDS THE LAW REGARDING THE TRANSMISSION OF FALSE OR FRAUDULENT SIGNALS OF DISTRESS OR COMMUNICATIONS RELATING THERETO.

Ans. No person within the jurisdiction of the United States (all radio stations and operators licensed by the Federal Communications Commission are under the jurisdiction of the United States) shall knowingly utter or transmit or cause to be uttered or transmitted any false or fraudulent signals of distress or communications relating thereto.

9. Q. STATE IN YOUR OWN WORDS THE SUBSTANCE OF THE COMMUNICATIONS ACT THAT IS PROVIDED TO INSURE THE SECRECY OF RADIOGRAMS.

Ans. No person receiving or assisting in receiving, transmitting, or assisting in transmitting any interstate or foreign communications by wire or radio, shall divulge or publish the existence, contents, substance, purport, effect, or meaning thereof except through authorized channels of transmission and reception to any person other than the addressee, his agent or attorney, or to a person employed or authorized to relay such communications to its destination, or to distributing officers of the various communication centers over which the radio-gram may be passed, or to the master of the ship under whom he is serving, or in response to a court order issued by a court of competent jurisdiction.

10. Q. DOES THE COMMUNICATIONS ACT OF 1934, AS AMENDED, CONTAIN ANY PROVISION THAT PROHIBITS THE INTERCEPTION, USE, AND PUBLICATION OF RADIO COMMUNICATION?

Ans. See answer to No. 9, above.

11. Q. WHAT FORM OF LANGUAGE, IF TRANSMITTED BY THE OPERATOR, RENDERS HIM SUBJECT TO THE PENAL PROVISIONS OF THE COMMUNICATIONS ACT?

Ans. No person within the jurisdiction of the United States shall.utter any obscene, indecent, or profane language by means of radio communication.

12. Q. WHAT PROVISIONS ARE MADE IN THE COMMUNICATIONS ACT TO INSURE COMMUNICATION BETWEEN STATIONS IN THE MOBILE SERVICE?

Ans. The Communications Act provides that every land station open to general public service between the coast and vessels at sea and within the scope of its normal operation be bound to exchange radio communication or signals with any ship at sea, and each station on shipboard at sea shall within the scope of its normal operation be bound to exchange radio communication or signals with any other station on shipboard at sea or with any land station open to general public service between the coast and vessels at sea.

13. Q. DOES THE FEDERAL COMMUNICATIONS COMMISSION HAVE AUTHORITY TO ISSUE A RADIO OPERATOR'S LICENSE OR PERMIT TO A CITIZEN OF A COUNTRY OTHER THAN THE UNITED STATES?

Ans. No. This is prohibited by the Communications Act of 1934.

14. Q. HAS THE MASTER OF A SHIP RADIOTELEPHONE STATION THE AUTHORITY TO FORBID THE TRANSMISSION OF MESSAGES BY ANYONE ON BOARD?

Ans. The Communications Act, as amended, states in effect that in case of a ship of the United States, the radio installation, the operators, transmission and receipt of messages except as may be regulated by law or international agreement or by rules and regulations in pursuance thereof, shall be under the supreme control of the master. Therefore, it appears that the master would be well within his rights in regulating or prohibiting the transmission of any radiotelephone or other communication from the ship.

15. Q. HAS THE MASTER OF A SHIP STATION THE AUTHORITY TO REGULATE THE TRANSMISSION OR RECEPTION OF MESSAGES ON SHIPBOARD?

Ans. See answer to No. 14, above.

16. Q. UNDER WHAT CONDITIONS IS THE UTTERANCE OR TRANSMISSION OF A FALSE OR FRAUDULENT SIGNAL OF DISTRESS OR COMMUNICATION RELATING THERETO PERMISSIBLE?

Ans. Under no condition. See answer to No. 8, above.

17. Q. UNDER WHAT CONDITION IS THE UTTERANCE OF OBSCENE, INDECENT, OR PROFANE LANGUAGE BY MEANS OF RADIO COMMUNICATION PERMISSIBLE?

Ans. Under no condition. See answer to No. 11, above.

18. Q. WHAT IS THE RADIOTELEPHONY SAFETY SIGNAL?

Ans. The Radiotelephony Safety Signal is the spoken word SECURITY repeated three times. Communications preceded by a safety signal are third in order of priority.

19. Q. UNDER WHAT CONDITIONS MAY A MOBILE STATION, IF NECESSARY, DISREGARD THE GENERAL RADIO REGULATIONS (CAIRO)?

Ans. A mobile station may use any means available to it for drawing attention, signaling its position, and obtaining help when in distress. When distress, emergency, or safety is involved, the telegraph transmission speed, in general shall not exceed 16 words per minute.

20. Q. WHAT IS THE RADIOTELEPHONY URGENT SIGNAL?

Ans. In radiotelephony the urgent signal shall consist of three transmissions of the expression PAN (corresponding to the French pronunciation of the word PANNE). It shall be transmitted before the call to indicate that the calling station has a very urgent message to transmit concerning the safety of a ship, and aircraft, or another vehicle, or concerning the safety of some person on board or sighted from on board.

21. Q. WHAT SIGNALS AND MESSAGES ARE FORBIDDEN BY INTERNATIONAL AGREEMENT?

Ans. The transmission of unnecessary or unidentified signals or correspondence shall be forbidden to all stations.

22. Q. WHAT PRECAUTIONS MUST AN OPERATOR OBSERVE BEFORE PROCEEDING WITH A TRANSMISSION.

Ans. Before transmitting, any station must keep watch over a sufficient interval to assure itself that it will cause no harmful interference with the transmissions being made within its range; if such interference is likely, the station shall await the first stop in the transmission which it may disturb.

23. Q. WHAT DOES THE RECEIPT OF THE SIGNAL PAN TRANSMITTED BY RADIOTELEPHONY INDICATE?

Ans. See answer to No. 20, above.

24. Q. WHAT SHOULD AN OPERATOR DO IF HE INTERCEPTS THE WORD SECURITY REPEATED THREE TIMES?

Ans. All stations hearing the safety signal must continue listening on the wave on which the safety signal has been sent until the message so announced has been completed; they must, moreover, keep silence on all waves likely to interfere with the message.

25. Q. AN URGENT SIGNAL SENT BY AN AIRCRAFT AND NOT FOLLOWED BY A MESSAGE INDICATES WHAT?

Ans. In aeronautical service the urgent signal PAN shall be used in radiotelephony to indicate that the aircraft transmitting is in trouble and is forced to land, but that it is not in need of immediate help. This signal, as far as possible, to be followed by a message giving additional information.

26. Q. WHAT OBLIGATION RESTS ON AN OPERATOR INTERCEPTING THE SIGNAL PAN?

Ans. PAN is the urgent signal used in radiotelephony and shall have priority over all other communications, except distress communications, and all mobile stations must take care not to interfere with the message which follows the URGENT signal.

27. Q. WHAT PROCEDURE MUST BE FOLLOWED BY A RADIO STATION RECEIVING A DISTRESS CALL FROM A MOBILE STATION WHICH IS UNQUESTIONABLY IN ITS VICINITY?

Ans. Stations of the mobile service which receive a distress message from a mobile station which is unquestionably in their vicinity must acknowledge receipt thereof at once.

28. Q. WHAT ESSENTIAL INFORMATION SHOULD BE TRANSMITTED IN A DISTRESS MESSAGE?

Ans. The name and position of the mobile station in distress together with any other information necessary for prompt and efficient aid by the station receiving the message.

29. Q. BY WHAT AUTHORITY MAY THE OPERATOR OF A SHIP OR AIRCRAFT STATION TRANSMIT A DISTRESS CALL OR MESSAGE?

Ans. The distress call and message shall be sent only by order of the master or person responsible for the ship, aircraft, or other vehicle carrying the mobile station.

30. Q. WHAT IS THE INTERNATIONAL DISTRESS SIGNAL TO BE USED IN RADIOTELEPHONY?

Ans. In radiotelephony, the distress signal shall consist of the spoken expression MAYDAY (corresponding to the French pronunciation of the expression M'AIDER), to announce that the ship, aircraft, or other vehicle which sends the signal is threatened by serious and imminent danger and requests immediate assistance.

31. Q. WHAT DOES THE INTERCEPTION OF MAYDAY TRANSMITTED BY TELEPHONY ANNOUNCE?

Ans. See answer to No. 30, above.

32. Q. WHAT RADIO WAVES MAY BE USED UNDER THE PROVISIONS OF THE TREATY IN TRANSMITTING DISTRESS MESSAGES IN CASE OF AN EMERGENCY BY AIRCRAFT STATIONS?

Ans. Any aircraft in distress must transmit the distress call on the watch wave of the land or mobile stations capable of helping it; when the call is addressed to stations of the maritime service, the waves (frequencies) to be used are the distress wave (frequency) or watch wave (frequency) of these stations.

33. Q. STATE THE PRIORITY OF RADIO COMMUNICATIONS IN THE MOBILE SERVICE.

Ans. The order of priority of radio communications in the mobile service shall be as follows:

1. Distress calls, distress messages, and distress traffic.
2. Communications preceded by an urgent signal.
3. Communications preceded by a safety signal.
4. Communications relative to radio direction finding bearings.
5. Government radio telegrams for which priority right has not been waived.
6. All other communications.

34. Q. WHAT INFORMATION MUST BE CONTAINED IN A DISTRESS MESSAGE TRANSMITTED IN AN EMERGENCY FROM A RADIO STATION ABOARD AIRCRAFT FLYING OVER LAND?

Ans. As a general rule, an aircraft flying over land shall signal its position by the name of the nearest locality, his approximate distance from this point, accompanied according to the case, by one of the words, NORTH, SOUTH, EAST, or WEST, or, in some cases, words indicating intermediate directions.

35. Q. WHAT INFORMATION MUST BE CONTAINED IN THE DISTRESS MESSAGE?

Ans. The message shall include the distress call followed by the name of the ship, aircraft, or the vehicle in distress, information regarding the position of the latter, the nature of the help requested, and any other further information which might facilitate this assistance.

36. Q. WHEN, AFTER HAVING SENT ITS DISTRESS MESSAGE AN AIRCRAFT STATION IS UNABLE TO SIGNAL ITS POSITION, WHAT PROCEDURE SHALL BE FOLLOWED TO ASSIST OTHERS IN DETERMINING ITS APPROXIMATE LOCATION?

Ans. When, in its distress message, an aircraft is unable to signal its position, it shall endeavor after transmission of the incomplete message to send its call signal long enough so that radio direction-finding stations may determine its position.

37. Q. STATE AT LEAST TWO CLASSES OF STATIONS WHICH CANNOT BE OPERATED BY THE HOLDER OF A RESTRICTED RADIOTELEPHONE OPERATOR'S PERMIT.

Ans. The holder of a restricted radiotelephone operator's permit may NOT operate any of the various classes of broadcast stations other than a relay broadcast station; he may NOT operate a coastal telephone station or a coastal harbor station other than in the Territory of Alaska; he may NOT operate a ship station licensed to use type A-3 emission for communication with coastal telephone stations.

38. Q. UNDER WHAT CONDITIONS MAY THE HOLDER OF A RESTRICTED RADIOTELEPHONE OPERATOR'S PERMIT OPERATE A STATION FOR WHICH THE PERMIT IS VALID?

Ans. The holder of a restricted radiotelephone operator's license may operate any station for which the permit is valid, provided that (a) he is prohibited from making adjustments that may result in improper transmitter operation; (b) the equipment is so designed that none of the operations necessary to be performed during the course of normal rendition of service may cause off-frequency operation or result in any unauthorized radiation; (c) any needed adjustments of the transmitter that may affect the proper operation of the station are regularly made by or in the presence of an operator holding a first-class or second class license, either telephone or telegraph, who shall be responsible for the proper operation of the equipment.

39. Q. STATE AT LEAST TWO CLASSES OF SHIP STATIONS WHICH THE HOLDER OF A RESTRICTED RADIOTELEGRAPH OPERATOR'S PERMIT IS PROHIBITED FROM OPERATING.

Ans. The holder of a restricted radiotelegraph operator's permit is prohibited from operating (a) any of the various classes of broadcast stations other than relay broadcast; (b) any ship station licensed to use type A-3 emission for communication with coastal telephone stations; (c) any radiotelegraph station on board a vessel required by treaty or statute to be equipped with a radio installation; (d) any ship telegraph, coastal telegraph, or marine relay station open to public correspondence.

40 Q. WHO IS PERMITTED TO MAKE ADJUSTMENTS OR TESTS IN THE PRESENCE OF THE LICENSED OPERATOR RESPONSIBLE FOR THE MAINTENANCE OF THE TRANSMITTER AND UNDER HIS RESPONSIBILITY FOR THE PROPER OPERATION OF THE EQUIPMENT?

Ans. Any person.

41. Q. WITHIN WHAT PERIOD OF TIME MUST ANY PERSON RECEIVING OFFICIAL NOTICE OF A VIOLATION OF THE TERMS OF THE OF THE COMMUNICATIONS ACT OF 1934, AS AMENDED, TREATY, OR RULES AND REGULATIONS OF THE COMMISSION, BE ANSWERED?

Ans. Within three days after receipt of notice of a violation, an answer must be sent to the Federal Communications Commission, Washington, D. C. and a copy thereof to the office of the Commission originating the notice of a violation, provided, however, that if an answer cannot be sent within three days by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay.

42. Q. WHAT IS THE OBLIGATION OF AN OPERATOR WHOSE LICENSE OR PERMIT HAS BEEN LOST, MUTILATED, OR DESTROYED?

Ans. An operator whose license or permit has been lost, mutilated, or destroyed shall immediately notify the Commission. A sworn application for a duplicate should be submitted to the office of issue embodying a statement attesting to the facts thereof. If a license has been lost, the applicant must state that a reasonable search has been made for it, and further, that in the event it be found either the original or the duplicate will be returned for cancellation. The applicant must also give a statement of the service that has been obtained under the lost license.

43. Q. HOW MAY THE HOLDER OF A RADIOTELEGRAPH OR RADIOTELEPHONE FIRST - OR SECOND - CLASS LICENSE INDICATE TO REPRESENTATIVE OF THE COMMISSION THAT HE IS LEGALLY QUALIFIED TO ADJUST EQUIPMENT OPERATED BY HOLDERS OF RESTRICTED RADIOTELEPHONE OPERATOR PERMITS?

Ans. The holder of a radiotelegraph or radiotelephone first - or second-class license who is employed as a service and maintenance operator at stations operated by holders of restricted operator permits shall post at such station his operator's license or a verified statement from the Commission, Form 759 properly executed, in lieu thereof.

44. Q. HOW MAY AN OPERATOR SHOW PROOF OF HIS LEGAL QUALIFICATIONS TO OPERATE A RADIO TRANSMITTER?

Ans. By posting his original operator's license at the place where he is on duty, or by keeping it in his possession in the manner specified in the regulations governing the class of station concerned. If two or more stations at which the post of license is required, are operated by the same operator, his license is required to be posted at the station which he principally operates and a verified statement from the commission, Form 759, properly executed, at each other station so operated.

45. Q. WHAT IS AN OPERATOR OF A RADIO STATION, WHO HAS SUBMITTED HIS LICENSE FOR RENEWAL OR APPLIED FOR A DUPLICATE LICENSE, REQUIRED TO EXHIBIT AS HIS AUTHORITY TO CONTINUE OPERATION OF THE STATION PENDING RECEIPT OF THE LICENSE?

Ans. When a duplicate operator's license or permit has been requested, or a request for renewal upon service has been made, the operator shall exhibit in lieu thereof a signed copy of the application for duplicate, or renewal, which has been submitted by him.

46. Q. WHAT IS THE HOLDER OF A RADIOTELEGRAPH OR RADIOTELEPHONE FIRST - OR SECOND - CLASS LICENSE, WHO IS EMPLOYED AS A SERVICE AND MAINTENANCE OPERATOR AT STATIONS OPERATED BY HOLDERS OF RESTRICTED OPERATOR PERMITS, OBLIGATED TO POST AT THE STATIONS?

Ans. See answer to No. 43, above.

47. Q. HOW MAY CORRECTIONS BE MADE IN A LOG?

Ans. Any necessary correction may be made only by the person originating the entry who shall strike out the erroneous portion, initial the correction made, and indicate the date of correction.

48. Q. IS IT LAWFUL TO ERASE AN ENTRY MADE IN A STATION LOG?

Ans. It is unlawful to erase an entry made in a station log.

49. Q. WHAT ARE THE COMMISSION'S REQUIREMENTS WITH REGARD TO THE RETENTION OF A RADIO-STATION LOG?

Ans. Logs of a radio station, when required by the Federal Communications Commission Rules and Regulations, must be kept for 1 year except when specifically specified for the particular service or class of station concerned, except that logs involving communications incident to a disaster or which include communications incident to or involved in an investigation by the Commission and concerning which the licensee has been notified, shall be retained by the licensee until specifically authorized in writing by the Commission to destroy them; and provided, further, that logs incident to or involved in any claim or complaint of which the licensee has notice shall be retained by the licensee until such claim or complaint has been fully satisfied or until the same has been barred by statute limiting the same for the filing of suits upon such claims.

50. Q. HOW LONG MUST THE LICENSEE RETAIN A STATION LOG WHICH INVOLVES COMMUNICATIONS INCIDENT TO A DISASTER?

Ans. See Answer to No. 49, above.

51. Q. WHAT IS THE COMMISSION'S RULE WITH REGARD TO ROUGH LOGS?

Ans. Rough logs may be transcribed into condensed form, but in such cases the original log or memoranda and all portions thereof shall be preserved and made a part of the complete log.

52. Q. WHAT PROCEDURE SHOULD ONE FOLLOW IF HE WISHES TO RESIST AN ORDER OF SUSPENSION OF HIS OPERATOR'S LICENSE OR PERMIT?

Ans. The notice of suspension shall not be effective until actually received by the operator, and he shall have 15 days in which to make an application to the Commission for a hearing. Upon receipt by the Commission of application for a hearing, said order of suspension shall be held in abeyance until the conclusion of the hearing, at which time the Commission will affirm, modify, or revoke said order of suspension.

53. Q. WHAT IS THE RESPONSIBILITY OF A LICENSEE OF A RADIO STATION WITH RESPECT TO PERMITTING IT TO BE INSPECTED BY REPRESENTATIVES OF THE COMMISSION?

Ans. The licensee of any radio station shall make the station available for inspection by representatives of the Commission at any reasonable hour and under the regulations governing the class of station concerned.

54. Q. WHO IS RESPONSIBLE FOR THE CONTROL OF DISTRESS TRAFFIC?

Ans. The control of distress traffic shall devolve upon the mobile station in distress, or upon any station which becomes aware that a mobile station is in distress when (a) the mobile station is not itself in a position to transmit the distress message, or (b) in the case of mobile stations when the master or person in charge of the mobile station believes that further help is necessary, or (c) in the case of other stations when directed by the station in control of the distress traffic to do so, when the control station has reason to believe that the distress call which it has intercepted has not been received by any station in a position to render aid.

55. Q. ARE LOGS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE COMMISSION?

Ans. The logs shall be made available upon request by authorized representatives of the Commission.

56. Q. BY WHOM MAY THE LOG OF A RADIO STATION BE KEPT?

Ans. Each log shall be kept by the person or persons competent to do so, having actual knowledge of the facts required, who shall sign the log when starting duty and again when going off duty.

57. Q. UNDER WHAT CONDITIONS MAY A DISTRESS MESSAGE BE RE-TRANSMITTED?

Ans. (a) When the station in distress is not itself in a position to do so; (b) in the case of mobile stations, when the master or the person in charge of the ship, aircraft, or other vehicle carrying the station which intervenes believes further help is necessary; (c) in the case of other station, when directed to do so by the station in control of distress traffic or when it has reason to believe that a distress call which it has intercepted has not been received by any station in a position to render aid.

58. Q. WHAT TOLERANCE IN OPERATING POWER IS PERMISSIBLE UNDER NORMAL CIRCUMSTANCES?

Ans. (a) When maximum power only is specified, the operating power shall not be greater than necessary to carry on the service and in no event more than 5% above the maximum power specified. (b) When the exact power is specified, the operating power shall not be more than 5% above nor less than 10% below such power.

59: Q. UNDER WHAT CONDITIONS MAY A STATION BE OPERATED IN A MANNER OTHER THAN THAT SPECIFIED IN THE STATION LICENSE?

Ans. The licensee of any station, except amateur, may, during a period of emergency such as disruption of normal communication facilities as a result of hurricane, flood, earthquake, or similar disaster, utilize such station for emergency communication in a manner other than that specified in the station license, provided that, as soon as possible after the beginning of such emergency operation, notice to be sent to the Commission at Washington, D. C., and to the inspector in charge of the district in which the station is located stating the nature of the emergency and the use to which the station is put and that emergency use of the station will be discontinued as soon as substantially normal communication facilities are again available, at which time the licensee shall notify the Commission in Washington, D. C., and the inspector in charge of the district in which the station is located that emergency operation has been terminated.

60. Q. WHAT IS THE COMMISSION'S RULE WITH RESPECT TO MEASUREMENT OF THE RADIO FREQUENCY?

Ans. The licensee of each station shall provide means for the measurement of the station frequency independent of the frequency control for the transmitter and measurements shall be conducted in accord with the regulations governing the class of station concerned.

61. Q. WHEN MAY OPERATION BE RESUMED AFTER A STATION HAS BEEN NOTIFIED TO CEASE TRANSMISSION BECAUSE OF INTERFERENCE TO DISTRESS TRAFFIC?

Ans. No station having been notified to cease operation shall resume operation on the frequency or frequencies which may cause interference to distress traffic, until notified by the station issuing the original notice that the station involved will not interfere with distress traffic as it is then being routed or until the receipt of a general notice that the need for handling distress traffic no longer exists.

END OF TEST

PART II

RADIO PROCEDURE WORDS AND PHRASES : DEFINITIONS

Word or Phrase	Meaning
ROGER	"I have received all of your last transmission."
ACKNOWLEDGE	Used by originator. "Let me know that you have received and understand this message."
WILCO	"Your last message received, understood, and will be complied with."
HOW DO YOU READ?	"How are you receiving and understanding my transmission?"
WAIT	"Stand by and wait for further instructions and information." (If pause is longer than a few seconds, the word WAIT must be followed with the word OUT.)
SAY AGAIN	Requesting a repetition.
I SAY AGAIN	A repetition will be given.
OVER	An invitation for a reply. The sender is finished with his transmission and awaits a reply from the recipient.
OUT	Out is final. The sender is finished with his transmission and has nothing further to say or request. No response expected.
CFR	Contact flight rules.
IFR	Instrument flight rules.
NOTAM	Notice to airmen.
ATC	Airway traffic control or airway traffic control center.

PART III

RADIO GROUND CONTACTS

According to the C.A.A. it is the responsibility of the pilot and not the control tower to initiate radio contact. Therefore all pilots should know how to use their radios and how to say what they have to say according to established C.A.A. procedures.

When you are ready to taxi, call the control tower and request TAXI INSTRUCTIONS. Airport traffic control towers should be identified during radiotelephone communications by the name of the airport followed by the word TOWER. The best procedure to follow is:

1. Make INITIAL CONTACT.
2. Give location of the aircraft on the field and
3. Request TAXI INSTRUCTIONS.

By making INITIAL CONTACT you establish radio contact with the control tower to make certain that the tower READS (hears) your transmission and that you have your receiver set right and can READ the tower. This is the usual procedure:

EXAMPLE:
AIRCRAFT: Kansas City Tower this is NC 12345. Over.
TOWER: NC 12345 this is Kansas City Tower. Over.

Very simple...but necessary. Sometimes if contact with the tower is not readily made, it may be necessary to TUNE your TRANSMITTER or RECEIVER more closely to tower frequency and again call the tower. Now, most towers are usually busy and their several radios make considerable noise, so it may be necessary for the pilot to give the tower a SHORT or LONG COUNT (or CALL). This is done as in the following example by giving a count...usually up to five or ten and back.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Stinson 87951...One, two, three, four, five.....five, four, three, two, one. Kansas City Tower this is Stinson 87951. How do you read on 3105? Over.
TOWER: Stinson 87951 Kansas City Tower. Read you clear and strong, Over.

After you, by one of the previously mentioned procedures, have established contact with the tower; it is then necessary to request TAXI INSTRUCTIONS. The procedure for this is as follows:

1. (Name of tower) Kansas City Tower.
2. (Identification of aircraft) Stinson 87951
3. (Location on field) North of tower...East of wind too, etc.
4. Request for information or instructions.
5. Invitation to reply.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Stinson 87951 in front of T.W.A. hangar. Request taxi instructions for take-off. Over.
TOWER: Stinson 87951, this is Kansas City Tower. Traffic is north. Cleared to runway 35. Taxi north on the ramp ...hold east of the runway. Over.
AIRCRAFT: Stinson 87951. Roger.

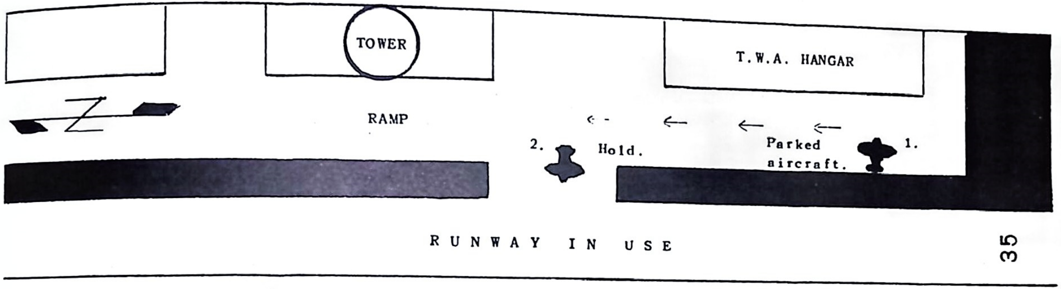
The instructions issued to Stinson 87951 by the tower were very clear and concise in their meaning. It is very important that you understand exactly what the tower wants you to do.

EXPLANATION: Diagram on page

1. Stinson 87951 (Identification of aircraft).
2. Traffic is north. (Direction of take-off and landing is to the north.)
3. Cleared to Runway 35. (The aircraft has been cleared by the tower to taxi from its parked position to the end of runway 35.)
4. Taxi north on ramp..hold east of runway. (The aircraft is to taxi on the ramp and to hold CLEAR of the runway in use so as not to interefere with other traffic on the HOT runway. (Runway in use)

It is very important that you should make certain that you understand the instructions and follow them exactly because it is the duty of the control tower to handle the traffic on the airport and the operators on duty in the tower know the airport and are in a better position to advise you how to taxi in order to stay clear of other traffic.

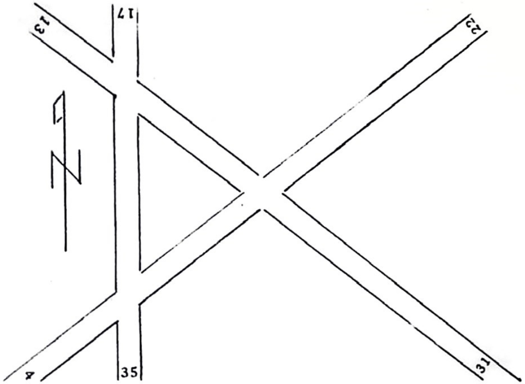
DIAGRAM SHOWING TAXI POSITION AND PROCEDURE FOR STINSON 87951 IN EXAMPLE



AIRPORT RUNWAY NUMBERS: Airport runways are numbered according to their magnetic headings or directions. For example, a runway is constructed running true north and south. The local magnetic variation is 10° east. The true runway direction is therefore converted to magnetic directions in order to eliminate individual computations by pilots taking-off or landing. The magnetic directions are given to the nearest tens of degrees and the final zero is omitted.

EXAMPLE: Runway - True North 360°
Mag. Var. 10° East
Mag. Direction 350°
RUNWAY NUMBER IS 35

Runway - True South 180°
Mag. Var. 10° East
Mag. Direction 170°
RUNWAY NUMBER IS 17



RUNWAY NUMBERING

IDENTIFICATION OF THE AIRCRAFT: The aircraft may be identified by the letters NC , NR , or NX as the case may be, followed by the serial number painted on the upper right, lower left wing surfaces and the vertical fin. However, according to the C.A.A. Standard Air Traffic Control Procedures: "Civil non-scheduled traffic (private aircraft) shall be described by at least the name of the manufacturer. The model, type or color also may be used to facilitate identification." This use of the name of the aircraft in lieu of NC will assist in expediting traffic in the control zone by assisting in the easy identification of the aircraft by the tower and other aircraft in the pattern. The tower will be able to issue appropriate instructions to the aircraft according to it's speed and position.

EXAMPLE: ERCOUPE 87186 STINSON 37130 CESSNA 20781

Due to the heavy flow of traffic at numerous airports it is necessary to shorten transmissions as much as possible. It is the general practice by tower and pilot, after initial contact has been made, to identify the aircraft by its name and the last three numbers of the serial number.

EXAMPLE: ERCOUPE 186 STINSON 130 CESSNA 781

TAKE-OFF CLEARANCES: After you have received your taxi instructions proceed to the position which the tower has cleared you. After checking the engine you should be ready for take-off. You should then call the tower for take-off clearance.

EXAMPLE:
AIRCRAFT: Ercoupe 87186 ready for take-off. Over.
TOWER: Ercoupe 186 cleared for take-off. Over.
AIRCRAFT: Ercoupe 186. Roger. (Aircraft then takes-off.)

If the direction of flight is so that a right turn out of the traffic will save you time, you may request a right turn out of traffic.

EXAMPLE:
AIRCRAFT: Stinson 37130 ready for take-off. Request right turn. Over.
TOWER: Stinson 130 right turn approved. Cleared for take-off. Over.
AIRCRAFT: Stinson 130. Roger. (The pilot then takes-off and makes a right turn out of the traffic pattern.

If traffic conditions are such that the tower cannot approve a right turn, the tower will answer a request for a right turn in the following manner.

EXAMPLE:
TOWER: Stinson 130. Unable to approve right turn. Cleared for take-off. Over.
AIRCRAFT: Stinson 130. Roger. (The pilot then takes-off and flys a regular left traffic pattern for the field.)

Ordinarily you will remain tuned to tower frequency until you are at least three miles from the airport. However, the tower may either request you to stand by on tower frequency or the tower may clear you from its frequency immediately after take-off.

EXAMPLE:
TOWER: Stinson 130. Cleared for take-off. Stand by on tower frequency. Over.
AIRCRAFT: Stinson 130. Roger. (The pilot then takes off and remains tuned to tower frequency).

TOWER: Stinson 130 off 39 (time in minutes only). Cleared to leave tower frequency.

The tower did not use the word OVER, and although it is not necessary to say anything, ordinarily you will reply as follows:

AIRCRAFT: Stinson 130. Roger. Out.

PART IV

AIR CONTACTS INBOUND

WHEN TO CONTACT TOWER: If operating under contact flight rules, arriving aircraft should establish communication with the control tower when approximately 15 miles from the airport of destination. The tower will issue such instructions as are necessary. PILOTS SHOULD REMAIN TUNED TO THE TOWER UNTIL THE LANDING IS COMPLETED AND THE AIRCRAFT IS PARKED. If on an instrument flight plan, arriving aircraft should remain on range frequency as long as required for natigational purposes. The control tower should not be contacted until after a "Clearance to the tower" has been received from "ATC" and the aircraft is 15 miles or less from the airport and clear of clouds, unless otherwise instructed. The clearance "Cleared to Blank Tower", is also approval for approach subject to any restrictions or instructions contained in the clearance. This clearance, without any restrictions, is approval to make approach for a landing using whatever type of approach desired by the pilot.

PILOT'S RESPONSIBILITY: As has been stated before, it is the pilot's responsibility and not the towers to make the initial contact and the examples shown for ground contacts are the same used in the air contacts. After you have established contact with the control tower, it is then necessary to ask for landing instructions.

EXAMPLE:

1. Name of Tower.
2. This is - (Aircraft identification.)
3. Aircraft position. (Time and altitude if deemed necessary.)
4. Request for desired information.
5. Invitation to reply.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Cessna 20781 ten west 30 (time in minutes only) at 2000 descending. Request landing instructions. Over.

The tower will then give the necessary instructions for the aircraft to make his approach for landing. The established C.A.A. procedure for this is as follows:

1. (Flight identification).
2. THIS IS (Name of Tower) TOWER.
3. (Reporting Point - The tower repeats the position given by the pilot.)
4. (Time over reporting point...in minutes only.)
5. AT (Altitude in thousands and hundreds of feet.)
6. CLEARED TO ENTER TRAFFIC PATTERN
7. AT (Specified altitude if necessary:)
8. TRAFFIC (Direction of landing traffic.)
9. RUNWAY (Number of runway in use.)
10. (Any special instructions or traffic information including wind direction and velocity.)

EXAMPLE # 1
TOWER: Cessna 20781 this is Kansas City Tower. 10 west. 30 at 2000 descending. Cleared to enter traffic pattern. Traffic north. Runway 35. Over.
AIRCRAFT: Cessna 20781. Roger.

EXAMPLE # 2
TOWER: Cessna 20781 this is Kansas City Tower. 10 west. 30 at 2000 descending. Cleared to enter RIGHT TRAFFIC PATTERN. Traffic north. Runway 35. Over.
AIRCRAFT: Cessna 781. Roger.

In example # 1 the tower cleared the aircraft to enter a regular left traffic pattern indicating the direction of landing and the runway number in use but leaving out the wind direction and velocity. This information, if desired, should be requested by the pilot.

EXAMPLE # 3
AIRCRAFT: Kansas City Tower this is Cessna 781. 10 west. 30 at 2000 descending. Request wind, altimeter, and landing instructions. Over.

TOWER; Cessna 781 this is Kansas City Tower. 10 west. 30 at 2000. Descending. Cleared to enter traffic pattern. Traffic North. Runway 35. Wind north 15. Altimeter 2985. Over.

In example #2 all of the information and instructions are the same with the exception of CLEARED TO ENTER RIGHT TRAFFIC PATTERN. Right turns into and out of fields are approved by control towers as often as is practical whenever they are requested. Towers may also instruct pilots to make right turns in and out in order to expedite flow of traffic. Ordinarily the pilot will request a right turn in or out if he desires it.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Cessna 781. 10 west. 30 at 2000 descending. Request landing instruction. Over.
TOWER: Cessna 781 this is Kansas City Tower. 10 west. 30 at 2000. Cleared to enter traffic pattern. Traffic is south. Runway 17. Over.

The tower did not give the aircraft a right turn in and if the pilot desires it he should request it in the following manner:

EXAMPLE:
AIRCRAFT: Kansas City Tower. This is Cessna 781. Will you approve a right turn in ?. Over.
TOWER: Cessna 781. Kansas City Tower. Right turn approved. Over.
AIRCRAFT: Cessna 781. Roger.

If traffic conditions are such that the tower cannot approve the right turn, they may answer as follows:

EXAMPLE:
TOWER: Cessna 781. Unable to approve right turn. Over.

In either case it is very easy for the pilot to understand whether he may or may not make the desired right turn.

After the pilot has received his landing instructions and is certain that he understands them, he will probably alter his course to the right or left (if necessary) so as to conform with the flow of traffic and the tower's instructions. As soon as he is in (or near) position to land he will call the tower and ask for landing clearance. Many times the tower will issue a landing clearance without the pilot calling for it. The following examples show how this may be accomplished:

EXAMPLE: # 1 AIRCRAFT NEARING FINAL APPROACH POSITION-
TOWER: Cessna 781 base leg. Cleared to land. Over.
(Note: The pilot need not request landing clearance. In most cases he merely gives his position...which will indicate to the tower that he is in position to land. The aircraft will usually be within sight of the tower.)

EXAMPLE: # 2 AIRCRAFT IN THE TRAFFIC PATTERN ALONG WITH OTHER AIRCRAFT.
AIRCRAFT: Kansas City Tower. Cessna 781 north-west of field...entering right-hand base leg. Over.
TOWER: Cessna 781 north-west of field..Number two (2) to land. Follow (type of aircraft) TWA Douglas (position) on final. Over.
AIRCRAFT: Cessna 781. Roger.

Due to the large increase in traffic at many fields, the pilot may very often encounter the foregoing type of clearance. Therefore, every pilot should be sure to know and understand exactly what to do when this condition is encountered. Under these conditions when the tower has issued such a clearance and has given the aircraft a SEQUENCE NUMBER, the pilot should ordinarily continue on his base leg. He may possibly alter his course slightly to the right or left (depending upon a right or left base leg) in order to make his final approach leg a little longer. This will be up to the pilot's discretion and depend on the position of the two aircraft which would, under CFR conditions, be in sight of each other. The tower may issue instructions to the aircraft which are self-explanatory and should be complied with immediately.

SPECIAL CLEARANCES IN THE AIR:

1. Make a left (or right) turn out of traffic.
2. Make a short (or wide) 270° (or 360°) turn to the right or left.
3. Extend base leg (or final.)
4. Make short final to land ahead of other aircraft.
5. Make long final to land behind other aircraft.

Clearance to engage in other than routine operations in the control zone may be given by the tower to the aircraft.

TOWER:

1. Cleared to make right turn.
2. Make a straight-in-approach.
3. Cleared to practice low approach to airport.
4. Cleared to make a touch and go landing.
5. Make a full stop landing.
6. Make short approach.
7. Make long approach.

8. Make normal approach.
9. Landing gear appears to be down and in place.
10. Right wheel is retracted.
11. Left wheel does not appear to be in place.
12. Circle the field.
13. Make a short circle to your (right or left) from present position.
14. Go around.
15. Maintain your present course.

Many of the foregoing instructions will have to be given quickly by the tower in order to prevent a collision or to assist in a smooth traffic flow. The pilot should become very familiar with these terms so that when he does hear them, he will immediately recognize the instructions and be able to act quickly and without excitement.

TAXI INSTRUCTIONS AFTER LANDING:

PILOT FAMILIAR WITH FIELD:

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Cessna 781. Request permission to taxi to TWA hangar. Over.
TOWER: Cessna 781 cleared to the TWA hangar. Over.
AIRCRAFT: Cessna 781. Roger.

PILOT UNFAMILIAR WITH FIELD:

The tower will usually issue instructions to taxi as soon as they believe the landing aircraft is under control and can be turned without danger of a ground loop.

EXAMPLE:
TOWER: Cessna 20781 make a right turn at first available intersection...taxi east...then south across the ramp. Over.
AIRCRAFT: Cessna 20781. Wilco.

THE AIRCRAFT WITH RECEIVER ONLY - RONLY

REMAIN TUNED TO THE TOWER AT ALL TIMES WHEN WITHIN THE AIRPORT TRAFFIC ZONE. Acknowledge signals in the daytime by movement of ailerons or rudder on the ground and by rocking wings in the air, and at night by flashing landing light. Clearance from the tower should be received for taxying, landing and taking-off; however, sufficient movement of the aircraft to attract the attention of the tower is permitted. If the tower does not issue radio instructions, watch for light signals, as the tower may not realize that the aircraft is equipped with a receiver.

Before departure, the pilot should advise the control tower personnel that the aircraft has receiver only (RONLY) and will be listening on tower frequency for instructions. After starting the engine, move the aircraft within sight of the tower. The tower will call and ask the pilot to acknowledge instructions as follows:

EXAMPLE:
TOWER: Taylorcraft 36151 this is Kansas City Tower. Acknowledge by moving ailerons (elevators or rudder).

The pilot acknowledges if he is reading (hearing) the tower. The tower will then go ahead with instructions in the usual manner. The pilot will answer by the same visual signals as if he were receiving a light signal...but of course, he will be listening to the tower operator's voice in his head set.

SPECIAL CLEARANCES ON THE GROUND:

Clearance to engage in other than routine operation in the control zone may be given by the tower to the aircraft.

TOWER:
1. Will advise later. Cleared for take-off.
2. Right turn approved. Cleared for take-off.
3. Hold your position.
4. Cleared into position and hold.
5. Cleared into position behind landing (type of aircraft and location unless landing aircraft is plainly visible to waiting pilot).
6. Hold (direction) of (position) or runway (number).
7. Advise when ready for take-off.
8. Cleared for immediate take-off.
9. Take-off immediately or clear the runway.

AIRCRAFT WITHOUT RADIO EQUIPMENT (NORDO)

Observe the tower for light signals and acknowledge by standard signals.

PART V

OBTAINING INFORMATION IN THE AIR

WEATHER: With the aircraft equipped with two-way radio, it is very convenient to receive information on weather conditions enroute and at the point of intended landing. This alone to the average pilot may mean the difference between a safe comfortable flight and a rough dangerous flight which may possibly end in disaster. Remember it is very easy to obtain weather information while in flight and all GOOD pilots utilize this information that is available to them for the asking.

All continuously operated C.A.A. Radio Range and Radio Beacon Stations having voice facilities on the range or radio beacon frequencies, broadcast weather reports at 15 and 45 minutes past each hour. At each station, the material broadcast consists of the latest available surface weather reports from locations within a radius of approximately 100 miles of the station.

The pilot finds on his map a range station or control tower which is near his present position. From the chart he determines the station's transmitting frequency.

EXAMPLE:
AIRCRAFT: Kansas City Radio (notice the pilot is calling the range station and using the word RADIO) This is Ercoupe 87186. Request latest weather for Columbia and St. Louis. Over.
The range station will probably have to look the weather sequences over and will answer something like this:
KANSAS CITY RADIO: Ercoupe 87186 this is Kansas City Radio. Columbia and St. Louis weather. Roger. Wait.
The range station operator secures the weather requested and returns to the air with:
KANSAS CITY RADIO: Ercoupe 186 this is Kansas City Radio. Over
AIRCRAFT: Kansas City Radio This is Ercoupe 186. Over.
KANSAS CITY RADIO: Ercoupe 186 - Columbia weather-0930 observation - High thin scattered, visibility 15 miles, wind south 10. St. Louis weather - 0930 observation - High scattered, visibility 15 miles, wind south 20 strong gusts. Over.
The pilot has copied the weather information and if he has nothing further to say to the range station he will close his transmission in the following manner:
AIRCRAFT: Ercoupe 186 - Roger. Thank you. Out.
The range operator knows ROGER means the pilot received the message. THANK YOU was not necessary but is considered good form and OUT means the pilot has nothing further to say.

FILING POSITION REPORTS

INSTRUMENT FLIGHT RULES: The only kind of flight plans ATC will accept on NC aircraft are INSTRUMENT and CFR - CONTROLLED FLIGHT PLANS, which to the control board is handled the same as an instrument plan and on either one of these it will be necessary to file position reports along the route. These position reports are very important to the ATC in order for them to control traffic. Therefore, IT IS VERY IMPORTANT FOR THE PILOT TO KNOW HOW TO FILE THEM. The information should be transmitted in the following order:

1. Point of departure and destination.
2. Time over station or fix.
3. Altitude.
4. Estimated time of arrival over next fix.

CONTACT FLIGHT RULES - CONTROLLED: Aircraft may be operated in weather conditions lower than the basic weather minima within control areas, airport approach zones, and airport traffic zones, providing the pilot files a flight plan specifying the route to be flown with an airway traffic control center or airport traffic control tower, he receives a traffic clearance or airport traffic clearance and he complies with all conditions stipulated in the clearance. Communication contacts and position reports may be required by Air Traffic Control for this type of flight, as traffic control separation will be afforded aircraft on the same basis as aircraft operating on an IFR flight plan.

CONTACT FLIGHT RULES: Airway traffic control no longer accepts CFR flight plans on NC aircraft, for transmission on long line circuits, so no position reports are required on CFR flights.

Since the communications stations often have traffic clearances and advisory information pertaining to the conditions along the route of flight which are intended for delivery to the pilot upon his reporting over the station or fix, a delay in the delivery of this information may result when the "OVER REPORTS" are not made to the communications station. PILOTS ARE URGED, AS FAR AS POSSIBLE, TO FILE "OVER REPORTS" WITH THE APPROPRIATE AIRWAYS COMMUNICATIONS STATION IN ORDER TO REALIZE THE MAXIMUM BENEFIT OF THIS SERVICE. In other words, use the call "RADIO" instead of "TOWER", and listen for a reply on the RANGE FREQUENCY.

After the pilot has established contact with the RANGE he should report his position as follows:

EXAMPLE:
AIRCRAFT: Columbia Radio this is Ercoupe 87186 on an Instrument Flight Plan from Kansas City to St. Louis. Over station at 57 (minutes only) five thousand. Estimate St. Louis at one-three-zero-zero. Over.

NOTE: 1. The words Instrument Flight Plan are spoken instead of IFR to avoid confusion with CFR under difficult radio reception conditions.
2. In radio telephony the twenty-four clock is used - and all numbers are spoken individually.

MISCELLANEOUS RADIO INFORMATION:

After the pilot has filed his position report he may desire other information which might include altimeter setting, winds aloft, or information concerning conditions of the airport of destination, tower frequency, range frequency and any other information about field conditions which might be of use to the pilot. The following examples will show how this information may be secured and from these examples the pilot will be able to ask for almost any type of information he desires simply by substitution in the examples shown:

ALL EXAMPLES SHOWN ARE AFTER INITIAL CONTACT.

EXAMPLE: # 1- ALTIMETER
AIRCRAFT: Columbia Radio - Ercoupe 186. Request latest St. Louis altimeter. Over.
COLUMBIA RADIO: Ercoupe 186 - St. Louis altimeter 2992 (two-nine-nine-two) Over.
AIRCRAFT: Ercoupe 186. Roger. OUT.

EXAMPLE: # 2-WINDS ALOFT
AIRCRAFT: Columbia Radio - Ercoupe 186. Request winds aloft between Columbia and St. Louis for 3 - 5 - 7 - 9 - thousand feet. Over.
COLUMBIA RADIO: Ercoupe 186. Roger. Wait.

COLUMBIA RADIO: Ercoupe 186 - Columbia radio. Over.
AIRCRAFT: Ercoupe 186. Over.
COLUMBIA RADIO: Ercoupe 186. Winds aloft Columbia to St. Louis.

3000	210°	26mph.
5000	200°	30mph.
7000	250°	35mph.
9000	270°	50mph.

AIRCRAFT: Ercoupe 186. Roger. Thank you. Out.

EXAMPLE: # 3 FIELD CONDITIONS
AIRCRAFT: Columbia Radio. Ercoupe 186. Could you give me condition of runways at Lambert Field - St. Louis? Over.
RANGE: Ercoupe 186. Roger. Wait.

RANGE: Ercoupe 186. Columbia Radio. Over.
AIRCRAFT: Ercoupe 186. Over.
RANGE: Ercoupe 186. Lambert Field NOTAM (date and time) Snow and ice on runways. Braking action poor. Use caution. Over.
AIRCRAFT: Ercoupe 186. Roger. Thank you. Out.

EXAMPLE # 4 FIELD CONDITIONS
AIRCRAFT: Columbia Radio. Ercoupe 87186. Over.
RANGE: Ercoupe 87186 - Columbia Radio. Over.
AIRCRAFT: Ercoupe 186 on a CFR flight..Kansas City to St. Louis. Request field conditions at Lambert Field. Over..
RANGE: Ercoupe 186. Roger. Wait.

RANGE: Ercoupe 186 - Columbia Radio. Over.
AIRCRAFT: Ercoupe 186. Over.
RANGE: Ercoupe 186 - Lambert Field (date) NOTAM, construction work along all runways. Men and equipment on field 0800 to 1700. Use caution. Over.
AIRCRAFT: Ercoupe 186. Roger. Thank you. Out.

EXAMPLE: # 5 TOWER OR RANGE FREQUENCY
AIRCRAFT: Kansas City Radio this is Stinson 37130. Over.
RANGE: Stinson 37130 this is Kansas City Radio. Over.
AIRCRAFT: Stinson 37130. Request transmitting frequency of Billard Tower - Topeka Kansas. Over.
RANGE: Stinson 130- Billard Tower transmits on 278 kilocycles. Over.
AIRCRAFT: Stinson 130. Roger. Thank you. Out.

FILING FLIGHT PLANS

Since CFR flight plans for transmission are only accepted from military aircraft, this section will pertain only to Instrument Flight Plans or CFR - Controlled Flight Plans.

The flight plan is to be filed with the nearest control tower having ATC land line communication facilities or the nearest C.A.A. communications station. If the aircraft is on an airport with none of these facilities the flight plan may be called in to the nearest control tower or communications station having these facilities by long distance telephone, or filed by radio with the nearest station.

Regardless of whether the pilot files the flight plan by radio on the ground or in the air, or by telephone, the order in which the information should be given is as follows:

NC 87186	Ercoupe	B.M. Smith	K.C.	5000	Green 4
IDENTIFICATION	TYPE	PILOT	FROM	PROPOSED ALTITUDE	ROUTE

L.S.	110	✓ /3117.5/3105/4495/6210/VHF/RONLY/NORDO/	1200
DESTINATION	AIR-SPEED	TRANSMITTING	PROPOSED OFF

	1 plus 45	CA	5
ACTUAL OFF	ELAPSED TIME	ALTERNATE	HOURS OF FUEL

REMARKS Work all ranges enroute.

ALTIMETER SETTINGS

If the airplane is equipped with a standard type altimeter with graduations of 200 to 500 feet, it should by all means be replaced by a sensitive altimeter which is graduated in 10 to 20 foot intervals. There are large surplus quantities of these precision instruments available at reasonable prices ranging as low as twenty dollars. The slight expense is more than justified by the precision allowed in flight altitudes and the use of the altimeter setting device incorporated in the sensitive altimeter.

For local flights of short duration a zero setting of the altimeter is often used. This will allow the pilot to have a direct reading of his actual altitude above the ground.

EXAMPLE: Local flight. Altimeter set at zero before take-off. To enter traffic pattern at 800 feet, enter with the altimeter indicating 800 feet. Upon landing the altimeter will read "zero".

All airlines and aircraft flying cross-sountry, fly with altimeter set to mean (average) sea level. This is commonly refered to as M.S.L. This is done because the airways traffic control bases all flight altitudes assigned in all directions on altitudes above mean sea level (MSL) and not actual altitudes above the relative ground. Therefore, the ground or station barometric pressure as given by the Weather Bureau is reduced to a sea level basis and when the sensitive altimeter is SET to this given barometric pressure, the instrument reads height above sea level and NOT height above the relative ground.

EXAMPLE: When assigned an elevation of 3000 feet flying east on Red # 1 airway, the pilot sets his altimeter to the barometric pressure (known as the altimeter or Kollsman SETTING) as given by the radio range or control tower and maintains 3000 feet indicated (M.S.L.) If, during his flight, the ground elevation in a certain locality rises to 1500 feet and the aircraft is actually only 1500 feet above the relative ground, as long as the sensitive altimeter indicates 3000 feet, the pilot will still be flying at his ASSIGNED M.S.L. ALTITUDE.

An airport has an elevation of 886 feet. The present local pressure reduced to sea level is 29.96 inches. The range station is broadcasting the altimeter setting in its weather broadcasts and the control tower will transmit the altimeter setting on request.

EXAMPLE:
AIRCRAFT: Billard Tower this is Cessna 20781 - 10 west - Request landing instructions and altimeter setting. Over.
TOWER: Cessna 20781 this is Billard Tower. 10 west. Cleared to enter traffic pattern. Traffic is north-east... runway 4. Wind north-east 10. Altimeter 2996. Over.
AIRCRAFT: Cessna 781. Roger.

The pilot of Cessna 20781 moves the adjusting knob of the altimeter until the window showing the barometric scale indicates 29.96. Checking the navigation chart he finds the elevation of Billard Airport is 886 feet. Upon landing the altimeter of Cessna 20781 will indicate NOT ZERO, but 886 feet...THE ACTUAL M.S.L. ELEVATION OF BILLARD AIRPORT.

While flying cross country, the pilot should contact the range stations along his route for the latest current altimeter settings and keep his aircraft altimeter set to these readings at all times. The pilot determines his actual altitude by simple computation between his indicated altitude and the ground elevation which is determined by reference to navigation charts.

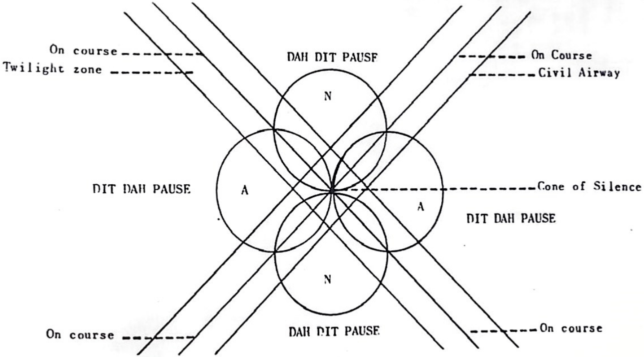
PART VI

THE RADIO RANGE

In most cases there are sufficient radio facilities in the United States that the pilot of an aircraft equipped with a good receiver, loop antenna, and lists giving the location and frequencies of radio ranges and broadcast stations, can navigate by radio over the greater part of the United States. However, due to the chance of mechanical failure of the radio in the aircraft or of the ground station and difficulty of reception during adverse weather conditions, it is not advisable to depend solely upon the radio. The pilot should be continually aware of his position by a combination of pilotage and dead reckoning methods.

The radio range is a directional or navigational aid maintained by the government. Its purposes are (1) A guide to be used by the pilot from point to point (following the beam); (2) A point for taking radio bearings (with loop antenna) and homing procedures; and (3) Orientation within the audible limits or boundarys of the range.

On the aeronautical charts of the U. S. Coast and Geodetic Survey, the radio range systems are shown in pink and the magnetic bearings are shown in the pink areas. (The bearings are magnetic at the range station.)



THE RADIO RANGE

Each radio range marks four courses which are ordinarily 90° apart. Two or more of these LEGS are usually directed or altered in order to be directed down the center of the airway. The letter "N" is always assigned to the quadrant through which the true north line from the station passes; or if the center of an equi-signal zone coincides with true north the letter "N" is assigned to the adjacent quadrant on the west.

The letter "N" (-.) in Morse code is first transmitted simultaneously into the north and south quadrants. The letter "A" is then transmitted simultaneously into the east and west quadrants. The course signals "N" and "A" are broadcast for 30 seconds, when they are interrupted and the station identification signals are broadcast twice, first in the "N" quadrants and then in the "A" quadrants. Seven seconds are used to transmit the station identification signals. This results in a complete sequence every 37 seconds. There are 12 "A's" and 12 "N's" transmitted between station identification signals.

Since the "N's" and "A's" overlap into their adjoining quadrants, they form a monotone...a signal of equal intensity or continuous dash known as the on-course or beam. If the pilot's course deviates to either side of the on-course beam, he will hear either the "A" or the "N" signal depending upon which quadrant he has entered. The beam or on-sourse signal is about 3° in width or approximately 1½° on either side of the center line.

LOCATING THE "ON-COURSE"

The range station should first be located on the current navigation chart or current issue of Air Navigation Radio Aids and identified by its transmitting frequency and identification signal.

1. If the relative "A" and "N" signal strength remains the same, the aircraft is flying directly toward or away from the range station.
2. If the relative strength of the weaker signal (background) decreases, the aircraft is getting farther away from the "on-course" signal.
3. If the relative strength of the weaker (background) signal increases, the aircraft is getting nearer to the "on-course" signal.

If the pilot intends to utilize the aircraft radio to the full purpose for which it was intended, he should refer to Civil Aeronautics Bulletin # 29 - Pilots' Radio Manual; Civil Aeronautics Bulletin # 24 - Practical Air Navigation, Chapter VII, and other instrument flying sources. These more technical manuals contain detailed descriptions of the various methods of orientation and associated maneuvers including: (1) Bisecting (2) 90° method (3) Fade-out method (4) Parallel method (5) Combination method (6) Radio-compass navigation (7) Procedure in taking bearings (8) Homing, etc.

"ON-COURSE FLYING"

According to Civil Air Regulations - Part 60.22 - RIGHT SIDE TRAFFIC: "Aircraft operating along a designated airway shall be flown to the right of the center line of such airway, unless otherwise authorized by a control tower." Therefore in flying along the airways, the pilot must fly on the right side of the "on-course". The right edge of the on-course may be identified by the strong on-course hum and the fainter right-hand zone signal heard in the background.

A 10° change of bearing, if made to the right from the edge of the on-course and held for about 10 seconds, with an airplane flying at 100 mph, will bring the airplane far enough into the right-hand signal zone to hear the right-hand signal everytime. The same correction, if made to the left, will take the airplane into the on-course signal in which the right-hand signals will not be heard at all. Flying along the right edge reduces wobbling or erratic course flying and keeps the pilot on the right side of the on-course, thus eliminating the possibility of collision with other aircraft.

A pilot should practice flying the radio ranges as much as possible whenever flying cross-country, even when it is CAVU, so as to become familiar with each particular range and the accompanying problems.

CONE OF SILENCE

Immediately above the range station there is an inverted cone-shaped area where the "A" and "N" signals cancel each other and no signal is heard. This area is known as the cone of silence.

As the pilot approaches the range station the beam becomes more narrow and although the volume control will ordinarily be turned nearly all the way down, the signal will still be coming in clear and strong. Just before entering the cone of silence, the volume of the signals increases rapidly. As the airplane enters the cone the signals fade out abruptly for a few seconds, depending upon the speed and altitude of the aircraft. After passing through the cone, the signals surge back with great volume before they begin to fade as the distance from the station increases.

When the pilot thinks he is in the cone of silence, a slight application of the right rudder will take him off the on-course into the right-hand signal zone. If the right-hand quadrant signals change from an "A" to an "N" or vice versa, the pilot will know that he has passed the true cone of silence of the range station. However, if the right-hand quadrant signal did not change, the pilot will know that he has not yet arrived at the range station and he has merely identified a "fade" as a cone of silence.

RADIO RANGE, AIRPORT AND OTHER DESIGNATIONS

AC.....APPROACH CONTROL TOWER C.A.A.
B......SCHEDULED BROADCAST STATION
C......CONTROL TOWER C.A.A.
CA.....CONTROL TOWER ARMY.
CI.....CONTROL TOWER (CITY, COUNTY, PRIVATE, ETC.)
CN.....CONTROL TOWER NAVY.
D......DISTANTLY CONTROLLED.
FM.....VHF FAN TYPE MARKER (100 WATTS)
GCA....GROUND CONTROL APPROACH SYSTEM.
H......NON DIRECTIONAL RADIO BEACON (HOMING) POWER 50 WATTS OR GREATER.
IAC....INSTRUMENT APPROACH CHART.
IM.....VHF INNER MARKER.
LFM....VHF FAN TYPE MARKER. LOW POWERED (5 WATTS) NOT OVER 10 MI. FROM RANGE.
MH.....NON-DIRECTIONAL RADIO BEACON (HOMING) POWER LESS THAN 50 WATTS.
ML.....RANGE (LOOP RADIATORS) POWER MORE THAN 50 LESS THAN 150 WATTS.
MRA....RANGE (ADCOCK, VERTICAL RADIATORS) POWER MORE THAN 50 LESS THAN 150 WATTS.
MRL....RANGE (LOOP RADIATORS) POWER MORE THAN 50 LESS THAN 150 WATTS.
OM.....VHF OUTER MARKER.
P......POINT TO POINT RADIO.
RA.....RANGE (ADCOCK, VERTICAL RADIATORS) POWER 150 WATTS OR MORE.
RL.....RANGE (LOOP RADIATORS) POWER 150 WATTS OR MORE.
S......SIMULTANEOUS TRANSMISSION OF RANGE SIGNALS AND VOICE.
T......TELETYPE.
TX.....PRINCIPAL TELETYPE.
V......VOICE COMMUNICATION WITH AIRCRAFT.
W......WITHOUT VOICE FACILITIES.
Z......VHF STATION LOCATION MARKER AT A RANGE STATION.

EXAMPLE: CLASS OF RANGE STATION.

Seattle, Washington - (SBRAZ-DTX)

Interpretation: A simultaneous broadcast (range voice and signals) using Adcock vertical radiators (150 watts or more) VHF "Z" marker at range station....and a distantly controlled principal teletype.

PHONETIC ALPHABET

During conditions of poor radio reception due to electrical disturbances, it is sometimes necessary, when transmitting, to spell a word slowly using the standard phonetic alphabet. This alphabet is listed below:

LETTER	SPOKEN AS	LETTER	SPOKEN AS
A	ABLE	N	NAN
B	BAKER	O	OBOE
C	CHARLIE	P	PETER
D	DOG	Q	QUEEN
E	EASY	R	ROGER
F	FOX	S	SUGAR
G	GEORGE	T	TAKE
H	HOW	U	UNCLE
I	ITEM	V	VICTOR
J	JIG	W	WILLIAM
K	KING	X	XRAY
L	LOVE	Y	YOKE
M	MIKE	Z	ZEBRA

EXAMPLE: CODE Spoken in phonetic alphabet = CHARLIE OBOE DOG EASY.

RADIOTELEGRAPH CODE

It is important to have at least a slight knowledge of radiotelegraph code particularly since the radio range station identification is given in code at a very slow rate of speed. The "A" and "N" quadrants are also given in code. The symbol (.) sounds and is spoken as (DIT). The symbol (-) sounds and is spoken as (DAH) Example: the letter "X" would sound and be spoken as: (DAH DIT DIT DAH).

A	.-	G	--.	M	--	S	...	Y	-.--	1	.----	6	-....	Period	.-.-.-
B	-...	H	....	N	-.	T	-	Z	--..	2	..---	7	--...	Comma	--..--
C	-.-.	I	..	O	---	U	..-			3	...--	8	---..	Error	......
D	-..	J	.---	P	.--.	V	...-			4	....-	9	----.	Interrogation	..--..
E	.	K	-.-	Q	--.-	W	.--			5	.....	0	-----	Wait	.-...
F	..-.	L	.-..	R	.-.	X	-..-								

End of message .-.-. Request for repetition ..--.. Invitation to transmit -.- End of transmission ...-.-

NUMBERS

In radio-telephony numerals are always spoken clearly and slowly as follows: 1 (ONE) 2 (TWO) 3 (THREE) 4 (FOUR) 5 (FIVE) 6 (SIX) 7 (SEVEN) 8 (EIGHT) 9 (NINE) 0 (ZERO).

THE 24 HOUR CLOCK

Aviation has come to use the 24 hour clock exclusively. It is used to such an extent in radio transmissions of all types that it is imperative that the pilot become very familiar with its use.

In the A.M. hours, precede the hour with a zero. (9:00 A.M. becomes 0900 and is spoken as ZERO NINE ZERO ZERO.) In the P.M. hours, add 12 to the number of hours (5:00 P.M. becomes 12 plus 5 equals 17 or 1700. Spoken it becomes....ONE SEVEN ZERO ZERO.

HOUR	WRITTEN AS	SPOKEN AS
9:30 A.M.	0930	ZERO NINE THREE ZERO
1:00 P.M.	1300	ONE THREE ZERO ZERO
11:30 P.M.	2330	TWO THREE THREE ZERO
Midnight	0000	ZERO ZERO ZERO ZERO

PART VII

THE AIRCRAFT RADIO

TUNING THE RADIO RECEIVER:

Assuming the receiver to be correctly calibrated, the proper procedure for tuning the receiver is as follows:

1. Turn receiver on.
2. Check band indicator to be sure you are set to the correct band.
3. Turn tuning knob until indicator is on the frequency desired.
4. Adjust volume control to provide satisfactory sound level.
5. Move tuning knob to right or left to achieve manimum signal strength.
6. If necessary, readjust volume.
7. Identify station by radio-facility information or navigation chart and station identification signal.

TRANSMITTING:

Pilots should speak distinctly and naturally, avoiding too fast a rate of speech. The microphone should be held very close to the mouth. Many pilots develop the technique of transmitting with the lower lip held lightly against the microphone.

The pilot should become familiar with the established radio procedures and think what he wants to say before beginning transmission. By doing this he will avoid confused transmissions and unnatural delays.

The pilot should always confine his transmission to flight matters and form the habit of following the C.A.A. radio procedures.

CHECKING AND REPAIRING THE AIRCRAFT RADIO:

It is important that both receiver and transmitter are in good working order; therefore they should both be checked regularly and if necessary, be repaired by a licensed radio mechanic. It is possible for you as a pilot to check the radio yourself AS LONG AS NO REPAIRS ARE MADE. The pilot may by visual check ascertain to a limited extent the working condition of the radio. It is a good habit before a flight to check the antenna for dirty insulators, breaks in the antenna and shorts on the lead-ins. All these things will greatly affect the proper operation of either the transmitter or the receiver; so if you would fly with trouble-free radio operations, always take that extra minute to check the antenna while you line-check the rest of the airplane.

It is also possible for the individual pilot to further check his radio to determine its working condition prior to flight. There are several parts to check including breaks in the wires; breaks in the insulation on the wires where they may rub against the airplane causing a short; loose connections; and broken shielding that might allow motor noise to interfere with reception. Be sure to check the microphone and earphone cords. Most of the causes of poor reception and transmission can be traced to these two cords. If the pilot finds any of the above mentioned irregularities, he should call a LICENSED RADIO MECHANIC and have them repaired at once in order to insure the best radio operation.

RADIO TESTS:

To make certain that your radio is working properly, it is permissible to make radio tests. In making these tests the pilot follows about the same procedure as that for making initial contacts.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Cessna 20781. How do you read on 3105? Over.
TOWER: Cessna 781 this is Kansas City Tower. Transmission normal. (Or- Cessna 781 read you clear and strong), Over.
AIRCRAFT: Cessna 781. Roger.

As has been previously explained, towers are usually busy and have considerable noise due to their several receivers. If contact is not made, again check your transmitter and receiver and again call the control tower. This time give the tower a COUNT and ask how the tower reads you.

EXAMPLE:
AIRCRAFT: Kansas City Tower this is Cessna 20781 - ONE TWO THREE FOUR FIVE....FIVE FOUR THREE TWO ONE . Kansas City Tower - Cessna 20781. How do you read? Over.

This procedure will ordinarily establish contact with the tower. However, if it does not, it is permissible after again checking both your receiver and transmitter to again call the tower; and if necessary, to repeat the procedure several times in order to establish contact with them. If you are still unable to contact the tower, it would be advisable to call a LICENSED RADIO MECHANIC and have him check and repair your radio equipment.

PART VIII

CONCLUSION

The most frequently used radio procedures as well as those not used so often have been included in this booklet. The authors have strived to phrase this material in a non-technical manner easily read and understood. Actual examples have been used throughout the book in order to give the reader a very definite idea of what each procedure means and how it would be used in actual practice.

If you will again go over the book, studying each example and trying to visualize each situation by putting yourself in the place of the pilot in the book; you should be able in a very short time to operate a two-way radio under any circumstances that may arise.

The benefits you will receive in knowing correct radio technique will enable you to fly with more self-confidence, greater ease, safety, and enjoyment. It will be of great advantage to you to be able to get weather reports and winds aloft reports so as to know what lies ahead of you and what altitude will be most advantageous to your flight.

The authors sincerely hope that all who read this booklet will realize a great deal of benefit from it and enjoy to the fullest extent their two-way radio and their RADIO FLYING.

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